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OMANONABIS: A NEW GENUS OF NABIDAE (HETEROPTERA) FROM WESTERN NORTH AMERICA, WITH A REVIEW OF *NABIS EDAX* BLATCHLEY

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Abstract.—*Omanonabis* NEW GENUS is proposed for the species *Nabis lovetti* Harris. Distinguishing features including illustrations of genitalia and scanning electron micrographs are provided. *Nabis edax* Blatchley is reviewed and distinguishing features, including illustrations of genitalia, are provided. Its morphology is compared with that of other species of *Nabis* and its taxonomic position is reevaluated.

Key Words.—Insecta, Heteroptera Nabidae, *Omanonabis, Nabis lovetti, Nabis edax*

Two species of Nabidae found along the Pacific coast of North America have puzzled heteropterists for some time, *Nabis lovetti* Harris and *Nabis edax* Blatchley. Harris recognized the distinctiveness of *lovetti* when he described it from California and Oregon in 1925, noting especially the dorsal pubescence, the spine-like tubercles on the genital capsule and the lance-like parameres. Even though Harris recognized subgenera of *Nabis* in his monograph of North American Nabidae (1928), he left *lovetti* in the nominal subgenus *Nabis* despite its unique characters. Although Mitri (1960) suggested that *lovetti* might deserve separate subgeneric placement based on its distinctive seminal depository, Henry & Lattin (1988) left it in the subgenus *Nabis* pending clarification of its proper position.

Nabis edax was described by Blatchley from Los Angeles, California in 1929, just after the appearance of Harris' monograph (1928). No other references to the species were published until Henry & Lattin (1988) retained it in the subgenus *Nabis* based on information received from Dr. Kerzhner of Leningrad. However, Mitri (1960) illustrated the female genitalia of a specimen from Alameda County, California, that could not be placed in any recognized species of North American *Nabis*; we now believe that this specimen represents *N. edax*. In this paper, we compare the morphology of these two species with other members of the genus *Nabis* and discuss their probable relationships, creating a new genus for *N. lovetti*.

OMANONABIS ASQUITH & LATTIN, NEW GENUS
(Figs. 1–7)

Type-Species.—*Nabis lovetti* Harris 1925:205 (California).

Description.—*Macropterous male:* Large, broadly linear, widest across middle of clavus; length (apex of tylus to apices of hemelytra) 7.9–9.1 mm. *Head:* Short, eyes large; ocelli raised above surface of vertex, but not prominent; head testaceous with broad median longitudinal black stripe. Ventral surface of head yellow, with two broad, longitudinal, pale fuscous stripes either side of midline. Antennal segment I slightly curved laterally, distal half slightly enlarged, yellow with ventral surface infuscated, with long, inclined, yellow setae. Antennal segment II linear, distinctly thinner than segment one, yellow with apex fuscous to black, with semierect, yellow setae. Segment III linear, testaceous; segment IV slightly but evenly enlarged distally, testaceous to black; both segments III and IV with semierect yellow setae. *Pronotum:* Campanulate, broader than long, widest across posterior margin; lateral

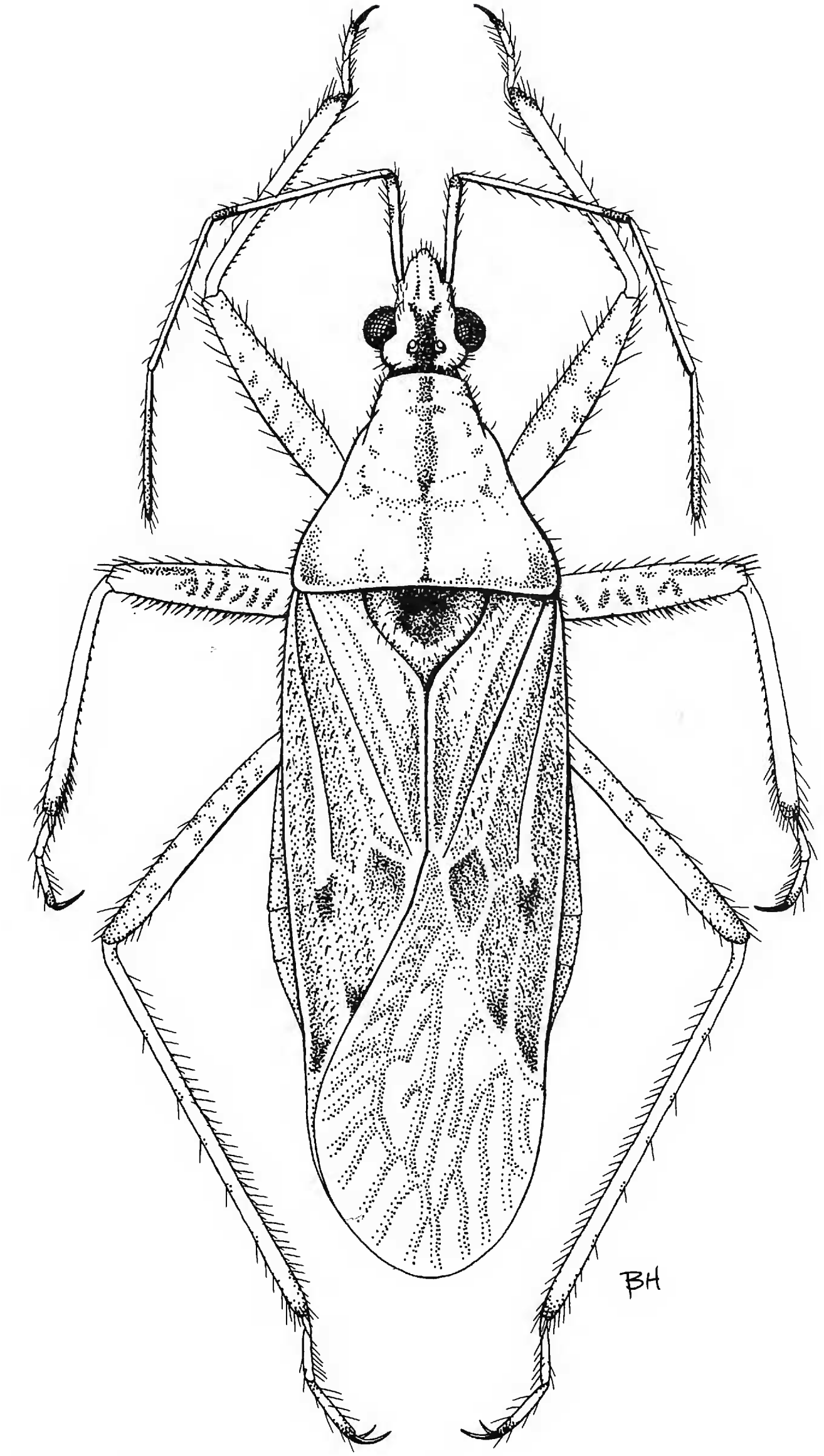


Figure 1. *Omanonabis lovetti* (Harris). Dorsal habitus.

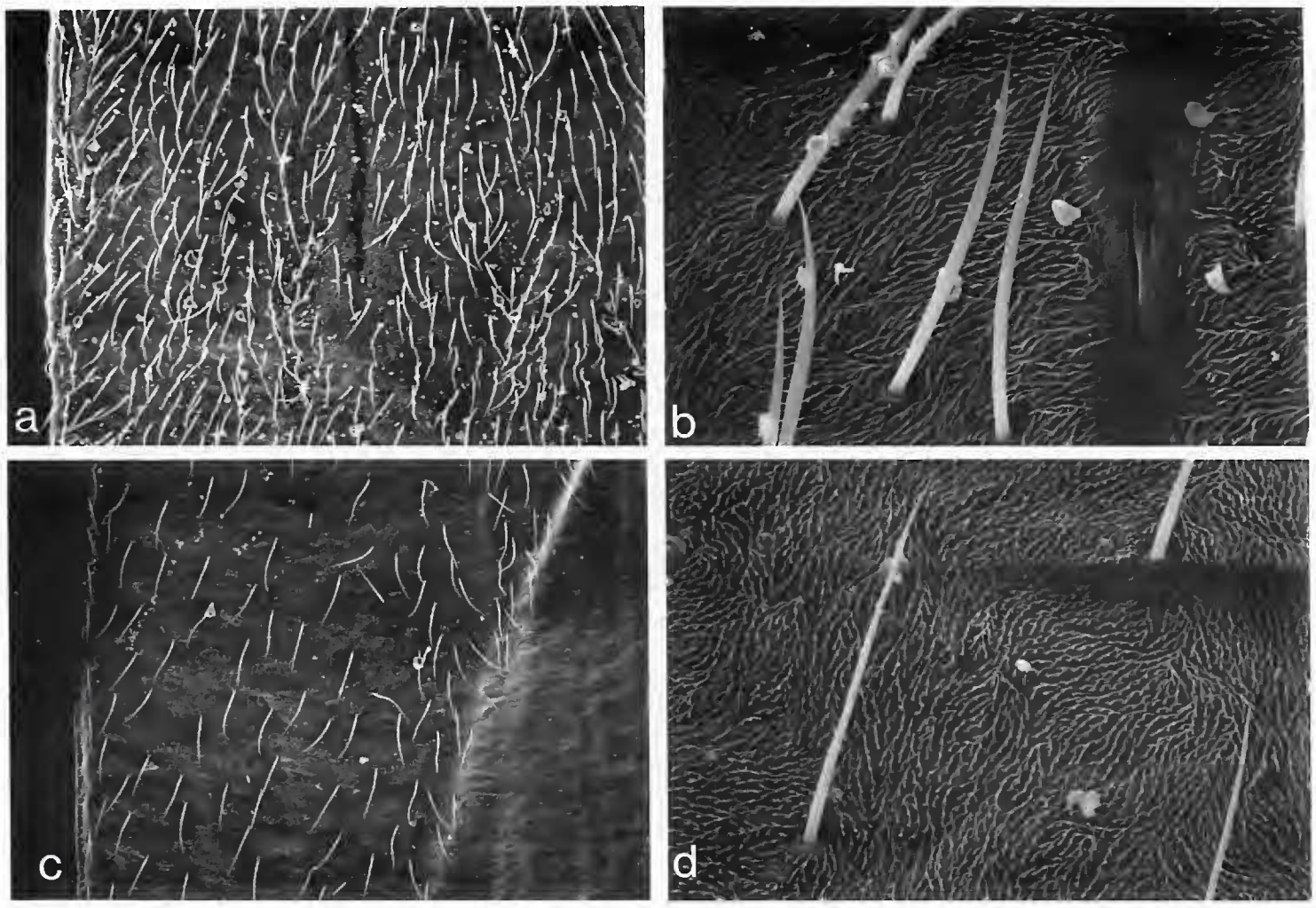


Figure 2. Hemelytral setae. a–b. *Omanonabis lovetti.* c–d. *Nabis roseipennis* Reuter.

margins slightly sinuous; posterior margin straight or slightly convex; posterior angles bluntly rounded; lateral and posterior margins weakly carinate. Collar distinct, length equal to width of eye, weakly punctate. Dorsal surface of anterior lobe with paired transverse rectangular areas either side of midline, surface slightly depressed, granulose. Posterior lobe with minute shallow punctures, dull yellow or testaceous, with fuscous median stripe; surface with short, reclined, golden setae and elongate, erect hairs. Scutellum broad, wider than long, two distinct fovea present either side of midline; fuscous, with anterior corners yellow; surface with short reclined golden setae and elongate erect hairs. *Hemelytra:* Elongate, tapering to apices; sides slightly arcuate, extending beyond end of abdomen; all veins distinctly elevated; anterior surface minutely, shallowly punctate; membrane with three closed cells, middle cell very narrow, gray-yellow, veins pale, bordered with fuscous; dorsal surface densely covered with short, reclined, golden setae (Fig. 2). *Venter:* Connexivum very broad, dorsolateral and midventral fuscous stripes running length of ventral surface. Lateral and ventral surface of abdomen with long, silver, silky pubescence. Channel of ostiolar peritreme very broad, surface smooth, dorsal half of posterior margin elevated and convex (Fig. 3). Tibiae relatively short. Apical pads on pro- and mesotibiae large, reaching to base of second tarsal segment. Profemora swollen, tapering distally. Mesofemora slightly enlarged, tapering distally; ventral surface with numerous long black teeth. Metafemora thick but not swollen, short, just reaching end of abdomen, slightly curved posteriorly. All appendages dotted with fuscous. Base of claws slightly swollen, occasionally with blunt tooth at base. *Genitalia:* Genital capsule extremely large, length equal to all anterior segments combined; anterolateral surface with small tooth on either side, oriented anteriorly (Fig. 4a). Posterior surface of genital capsule concave, with posterior corners rounded and slightly enlarged. Parameres very narrow and elongate with apex strongly recurved dorsally (Fig. 4b); lateral margin with strong keel; base of lateral surface with broad band of erect pale setae. Aedeagus long and narrow, twisted at middle, with four large sclerites (Fig. 5).

Brachypterous Male.—As macropterous male, except: more oval in outline, total length 7.2–8.3 mm. Pronotum more evenly triangular, less campanulate; posterior lobe narrower. Hemelytra narrow, connexivum visible in dorsal view, reaching to anterior margin of genital capsule; apex narrowed to blunt point; membrane with only two closed cells. Hind wings reaching to 4th or 5th abdominal tergite.

Figure 3. Left metathoracic scent gland of *Omanonabis lovetti.*

Female.—Similar to male, slightly smaller (Table 1), total length 7.2–8.6 mm. All antennal segments shorter than male. Hemelytra of macropterous form reaching to last abdominal tergite. *Genitalia:* Seminal depository oblong oval, basally constricted (Fig. 6); oviducts arise separately from dorsal surface, separated by a raised sclerotized structure; spermatheca prominent, arising baso-medially and directed basally to cover base of ovipositor. Two paired, elongate-oval sclerotized rings present on ventro-lateral surface.

Diagnosis.—This genus is readily distinguished by the short, dense, golden pubescence on the hemelytra (Fig. 2a); the broad, flat, anterior surface of the ostiolar peritreme (Fig. 3); the extremely large male genital capsule with spines present on the anterolateral margins (Fig. 4a), and the elongate, lanceolate parameres (Fig. 4b).

Etymology.—This genus is named in honor of our esteemed colleague, Dr. Paul Oman, Professor Emeritus of Entomology at Oregon State University. He has shared with us his vast knowledge of entomology and his friendship.

Omanonabis lovettii (Harris) 1925:205, NEW COMBINATION

Type.—Holotype male, *Nabis lovetti* Harris. CALIFORNIA. *SAN FRANCISCO Co.:* Ingleside, 20 Dec 1920, H. Dietrich; deposited U.S. National Museum of Natural History, Washington, D.C.

Redescription.—Male.—Most characters as in generic description. *Genitalia:* Aedeagus with four large sclerites (Fig. 5); basalmost sclerite smallest, linear, gradually tapering distally with apex oriented towards apex of aedeagus; second sclerite just basad of twist in aedeagus, linear, slightly curved, widest at base, tapering to a sharp apex, oriented towards apex of aedeagus; third sclerite largest, linear, blade-shaped, distal half incompletely bifid into two blades, oriented towards apex of aedeagus; distalmost sclerite just basad of sclerotized "cap," comb-shaped, with three large teeth of unequal shape and size. Aedeagus with two patches of minute denticles, one area just basad of middle twist, the other basad and underneath sclerotized "cap."

Distribution.—This species occurs along the Pacific coast from southwestern

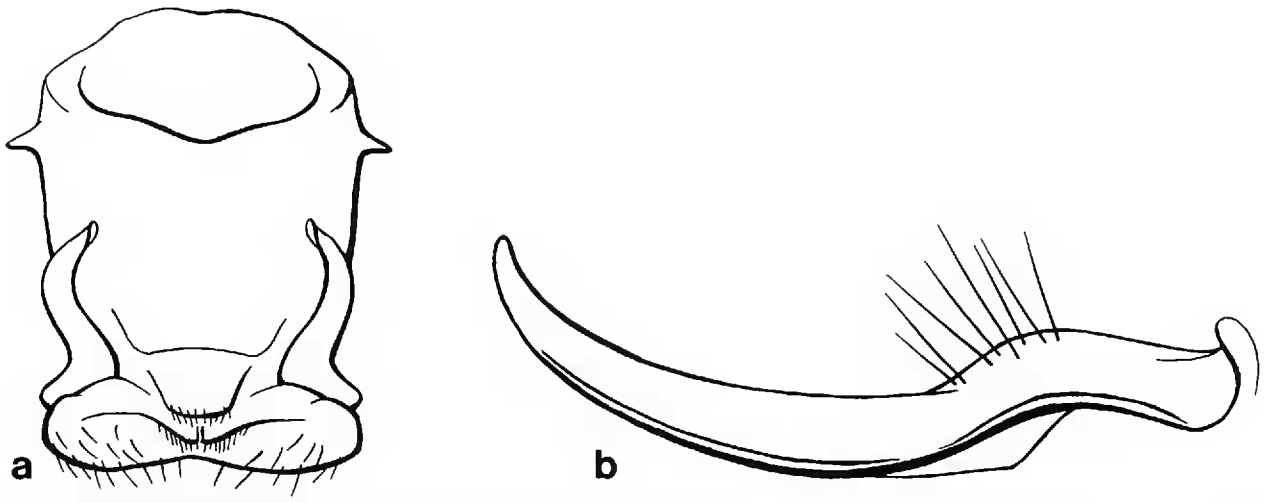


Figure 4. Genitalia of *Omanonabis lovetti.* a. Male genital capsule, dorsal view. b. Paramere, lateral view.

British Columbia (Scudder 1985) south to Monterey, California (Harris 1925, 1928) (Fig. 7). It is most common in the coastal salt marshes, and in the Willamette-Puget Lowlands, but is also found in a few marshy habitats east of the Cascade Mountains in southern Oregon. This species has also been reported from Lake Provo, Utah (Torre-Bueno 1934). This locality is greatly disjunct from the known range of *lovetti* and needs to be confirmed.

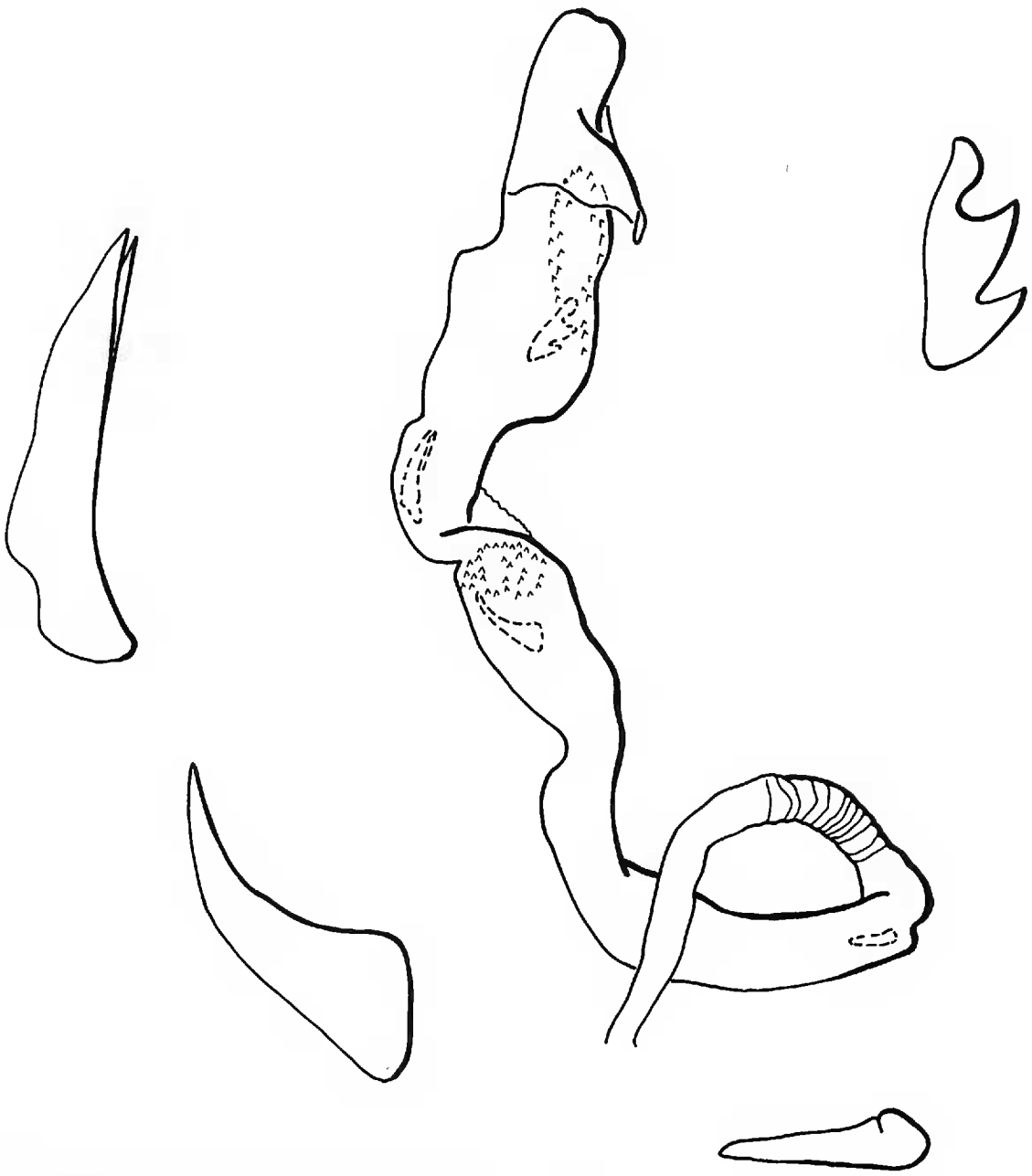


Figure 5. Genitalia of *Omanonabis lovetti,* Aedeagus.

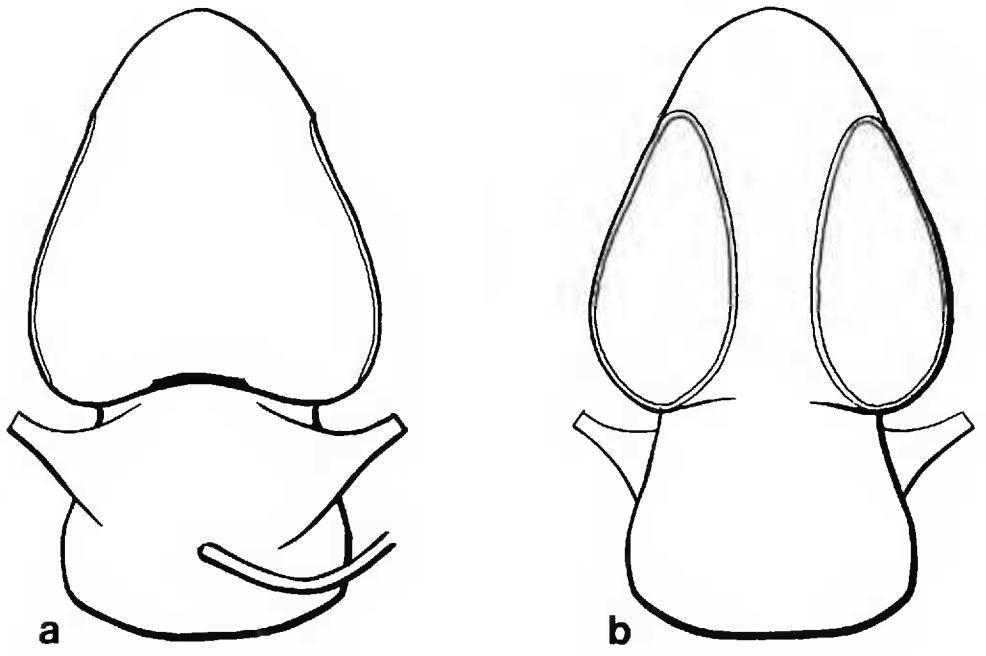


Figure 6. Genitalia of *Omanonabis lovetti,* Seminal depository. a. Ventral view. b. Dorsal view.

Material Examined.—USA. CALIFORNIA. *DEL NORTE Co.:* Lake Earl, 24 Nov 1959, J. Schuh (AMNH). *MARIN Co.:* 1.7 km (1 mi) S of Inverness, 11 Dec 1953, P. D. Ashlock, salt marsh; Point Reyes, 21 Aug 1952, P. D. Ashlock; (5 mi) SW of Point Reyes Sta., 14 Nov 1952, J. D. Lattin. *MONTEREY Co.:* Carmel, 27 May 1922. *SAN FRANCISCO Co.:* Ingleside, 20 Dec 1920, H. Dietrich. *SAN MATEO Co.:* San Bruno Mts, 16 Aug 1969, R. P. Rapp. *SONOMA Co.:* Sonoma. OREGON. *BENTON Co.:* Corvallis, 1918, A. L. Lovett (Harris 1925); Corvallis, 10 Oct 1957; MacDonald Forest, 1 Oct 1975; McFadden Pond, 16.7 km (10 mi) S of Corvallis, 17 Oct 1967, P. Oman; Peavy Arboretum, 21 Oct 1980, G. Cassis, sweeping; 5.8 km (3.5 mi) NE of Summit, 5 Oct 1961, J. D. Lattin; Willamette Riv, 12 Oct 1977, J. D. Lattin, ex willow; Winkle Lake, 16.7 km (10 mi) S of Corvallis, 8 Oct 1959, J. D. Lattin. *COLUMBIA Co.:* Scappoose, 16 Apr 1958, K. Gray; Vernonia, 21 Apr 1936, K. Gray. *CURRY Co.:* South Slough Sanctuary, S of Charleston, 24 Sep 1988, A. Asquith. *DESCHUTES Co.:* Indian Ford, 6 Jun 1957, B. Malkin. *JACKSON Co.:* Buckhorn Mineral Springs, 18.3 km (11 mi) ESE of Ashland, 853 mm (2800 ft), 19 May 1960, J. D. Lattin. *KLAMATH Co.:* Klamath Falls, Algoma, 10 May 1955, J. Schuh; Lost River, 13.3 km (8 mi) SE of Dairy, 4 Aug 1966, W. Gagne & J. Haddock. *LANE Co.:* 6.7 km (4 mi) N of Noti, 19 Mar 1963, J. D. Lattin; Siltcoos Park, 2 Nov 1968, M. Stock; Winchester Bay, 13 Jun 1947, B. Malkin & I. M. Newell. *LINCOLN Co.:* 5.8 km (3.5 mi) NE of Harlan, 7 Apr 1960, J. D. Lattin; South Beach St. Park, 1.6 km (2 mi) S of Newport, 7 Nov 1988, A. Asquith, in deflation plain; Yachats, flood plain of Yachats Riv, 14 Apr 1970, P. Oman. *POLK Co.:* 4H Education Center, 7 Jul 1973, L. Russell. *TILLAMOOK Co.:* Cape Lookout St. Park, 11 Sep 1988, A. Asquith; 1.6 km (2 mi) SE of Pacific City, 1 May 1973, J. D. Lattin; Sandlake, peat bog, 20 Sep 1962, K. Goeden; 1.6 km (2 mi) S of Sand Lake, 13 Jun 1972, W.N. Mathis; hwy 101, N of Siletz Riv, 11 Sep 1988, A. Asquith. *WASHINGTON Co.:* Hillsboro, Apr 1919, L.P. Rockwood, ex skunk cabbage. WASHINGTON. *KING Co.:* Bothell, 28 Apr 1964; Lake Sammamish St Park, 6 May 1969, R. Levenson.

The Relationships of *Omanonabis*

We have seen neither the dense pubescence nor the teeth on the genital capsule in any other genus of nabids, and these characters may be unique to *Omanonabis.* The setae are not unusual in their structure and are only slightly larger in diameter than those of *Nabis roseipennis* (Fig. 2). Also distinctive is the broad, flat anterior surface of the peritreme channel. In species of *Nabis* and *Halonabis* the channel is clearly much narrower (Fig. 11).

Omanonabis does not appear to be related to any other North American genus of Nabini. Although it shares several characters in common with Palaearctic genera, we suspect that these characters are plesiomorphic. For example, several to many small sclerites in the aedeagus are found in the Palaearctic genera *Himacerus, Aptus, Stalia, Halonabis, Aspilaspis* and in *Omanonabis.* In almost all

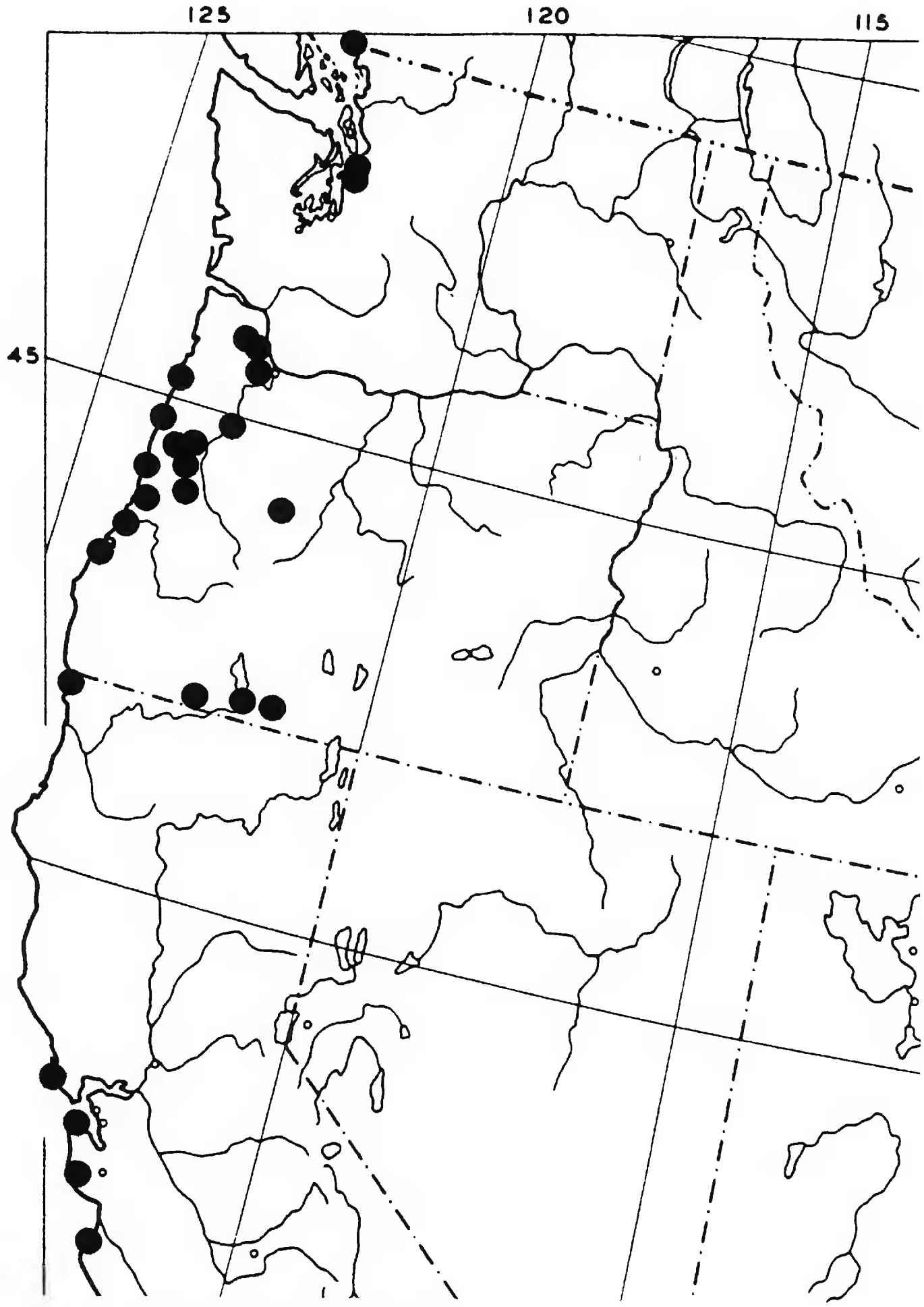


Figure 7. Distribution of *Omanonabis lovetti.*

species of *Nabicula* and *Nabis,* the small distal sclerites have been lost, and one or two large basal sclerites are retained (Fig. 8). In some species (*N.* (*Reduviolus*) *alternatus*) even the two basal sclerites have been lost (Fig. 9). We believe that the coalescence and loss of the distal sclerites in *Nabicula* and *Nabis* is more parsimonious than several independent origins of mutliple, small sclerites. There-

Table 1. Comparison of macropterous and brachypterous male and female *Omanonabis lovetti.* Measurements are given in millimeters as mean plus range.

Measurement $\bar{x}$ (range)	Male		Female	
	Macropterous	Brachypterous	Macropterous	Brachypterous
Total length	8.7 (7.9–9.1)	7.8 (7.2–8.3)	8.2 (8.0–8.6)	7.4 (7.2–7.6)
Pronotum length	1.78 (1.60–1.88)	1.68 (1.55–1.79)	1.74 (1.69–1.81)	1.61 (1.55–1.67)
Pronotum width	2.26 (2.04–2.36)	2.02 (1.91–2.14)	2.22 (2.13–2.28)	1.93 (1.85–1.99)
Head width	1.03 (0.95–1.01)	1.04 (0.99–1.09)	0.97 (0.92–1.01)	0.99 (0.95–1.02)
Antennal segment I	0.90 (0.83–0.95)	0.92 (0.87–0.96)	0.78 (0.53–0.87)	0.86 (0.77–0.89)
Antennal segment II	1.46 (1.37–1.51)	1.56 (1.06–1.41)	1.32 (1.17–1.27)	1.22 (1.15–1.29)
Antennal segment III	1.30 (1.26–1.40)	1.31 (1.06–1.41)	1.21 (1.17–1.27)	1.22 (1.15–1.29)
Antennal segment IV	1.04 (0.92–1.10)	1.07 (1.03–1.22)	1.03 (1.01–1.03)	1.06 (0.96–1.18)

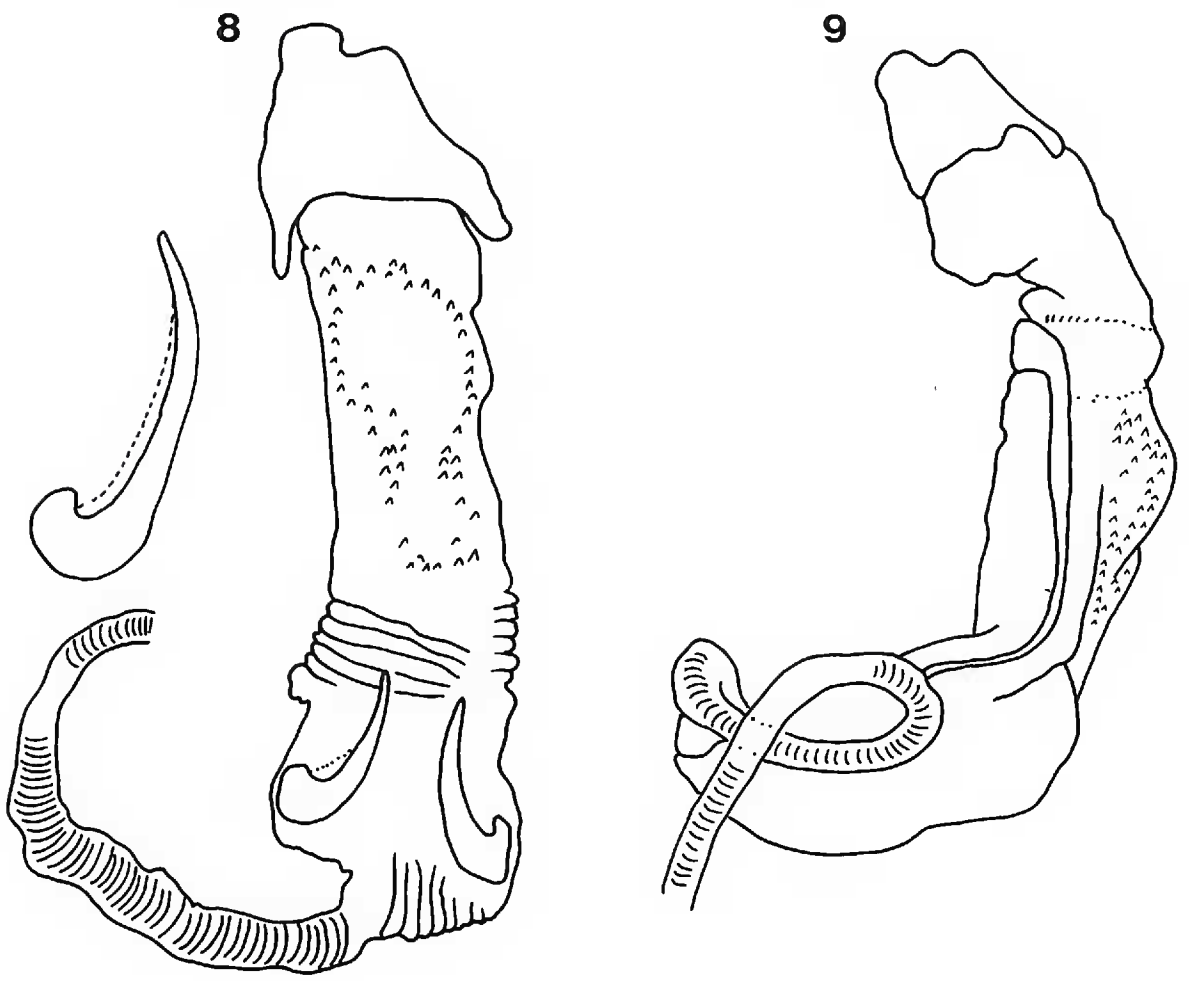
fore, although *Omanonabis* retains several distal sclerites, it cannot be grouped with the other genera that display this morphology, but it can be removed from the genus *Nabis,* which has lost this condition.

Superficially, the parameres of *Omanonabis* closely resemble those of *Halonabis.* In the latter genus, however, a wide, longitudinal groove is present which begins basally on the ventral margin of the paramere, but turns dorsal to run along the lateral margin distally. In *Omanonabis,* this groove is present, but it is much narrower and is restricted to the ventral margin of the paramere. Besides lacking the other diagnostic features of *Omanonabis, Halonabis* also differs by lacking spinules on the ventral surface of the fore femora, having proportionately much larger eyes and having the apical third of the head weakly curved ventrally. Species of *Aspilaspis* also have a rather elongate, linear paramere. If the lanceolate paramere is homologous, then *Omanonabis* may be related to *Halonabis* and *Aspilapsis.* The two Palaearctic genera are Mediterranean in distribution and are also ground inhabiting, preferring moist habitats (Pericart 1987).

The Relationships of *Nabis edax*

Nabis edax Blatchley was described from a single male specimen from Los Angeles, California (Blatchley 1929). This species has not been reported since, and was apparently known only from the specimen used in the original description. Based on an examination of this specimen, Kerzhner (reported in Henry & Lattin 1988) placed this species in the subgenus *Nabis,* with *N. roseipennis* Reuter and *rufusculus* Reuter. Here, we provide a description of the female of *N. edax,* detail the male and female genitalia, and reassess its taxonomic position.

In an unpublished Master's thesis dealing with the female genitalia of the Nabidae, Mitri (1960) figured the seminal depository of a specimen from Milpitas, Alameda Co., California. He noted that the structure of the seminal depository was unlike that of any other North American species for which females were known. Recently, additional single females were discovered in the collections of the California Academy of Sciences and the University of California, Berkeley that also possess this unique seminal depository structure. Mitri (1960) stated that he could not discern sclerotized rings in this species, but presumed they were present and merely lightly sclerotized. We have reexamined the specimen he dissected and one additional specimen. We also could not identify sclerotized



Figures 8–9. Aedeagus. 8. *Nabis* (*Nabis*) *roseipennis.* 9. Aedeagus of *Nabis* (*Reduviolus*) *alternatus.*

rings, although a thin structure at the ventral surface of the base may represent the vestiges of the rings. In addition, male specimens of *N. edax* were also discovered. All specimens were collected from central and southern California, from San Francisco to Los Angeles.

There are two possible explanations for this scenario. First, that there are two species in southern California, *N. edax,* known only from male specimens, and an undescribed species, known only from female specimens. We consider this very unlikely, because most North American Nabidae have relatively large ranges, and two closely related species confined to the same restricted area would be most unusual. Second, that the female specimens are *N. edax.* We believe this to be the case, because both male and female specimens share combinations of characters not possessed by any other North American species.

Taxonomic Position.—Kerzhner assigned *edax* to the subgenus *Nabis* (Henry and Lattin 1988) with the other two North American members, *N. roseipennis* Reuter and *N. rufusculus* Reuter. However, *N. roseipennis* has two sclerites in the aedeagus both with large hooks at the base (Fig. 8), and *N. rufusculus* has two large sclerites at the base and one small sclerite at the distal end of the aedeagus. The seminal depositories of *roseipennis* and *rufusculus* are broadly spindle shaped, and both have a single, large, bilobed sclerotized ring covering the anterior and antero-ventral surface of the depositories. *N. edax* shares no characters in common with these species and therefore clearly is not a member of the subgenus *Nabis.*

Remane (1964) designated several species groups in the genus *Nabis,* two of which contain species with a single sclerite in the aedeagus similar to *N. edax.* In the *rugosus* group, *N. brevis* Schultz has only a single sclerite, but it bears a tooth

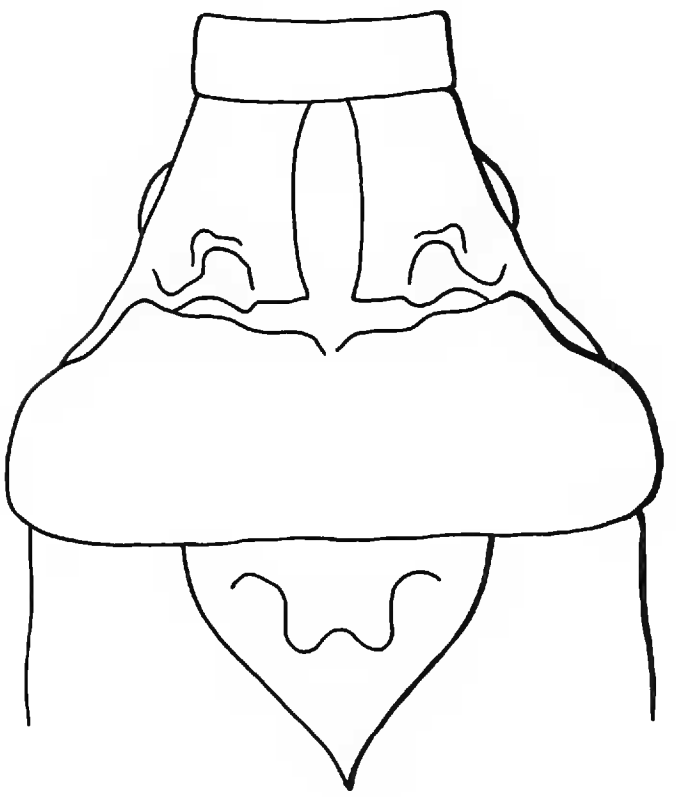


Figure 10. Dorsal view of the pronotum of *Nabis edax* Blatchley. Female.

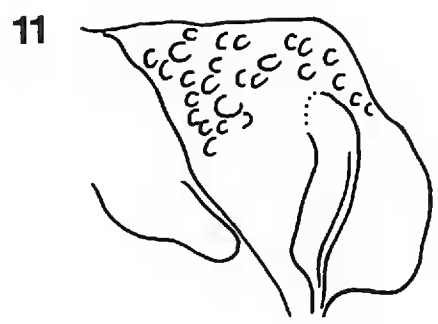
near its base and it is situated near the base of the aedeagus. In addition, this group contains predominately short-winged forms, and *N. edax* is known only from macropterous specimens. In the *ferus* group, both *N. ferus* (L.) and *N. palifer* Seid. have but a single sclerite. In *ferus,* however, the sclerite has a large, well developed hook at the base, and in *palifer,* the sclerite is very small, only half the length of that in *edax.* In addition, the seminal depository of the *ferus* group is large, membranous, with a large sclerotized ring that occupies most of the antero-ventral surface of the seminal depository.

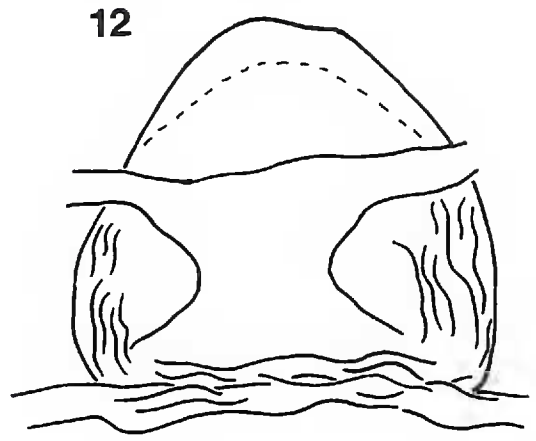
The subgenus *Reduviolus* Kirby which includes *N. alternatus* Parshley and *N. americoferus* Carayon, is predominately a North American group, with the exception of *N. inscriptus* (Kirby) which is Holarctic in distribution. The female depository in this group is short and symmetric with a small thin sclerotized ring on the postero-ventral surface, very similar to *N. edax.* However, all members of the *inscriptus* group lack any sclerites in the aedeagus.

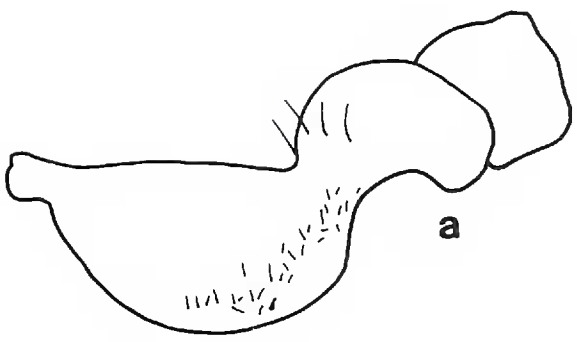
It appears that *N. edax* Blatchley cannot be placed in any of the taxonomic subdivisions presently recognized in the genus *Nabis.* It is most similar to members of the subgenus *Reduviolus,* but is not closely related to any of these North American species. Examinations of a few Mexican and South American species of *Nabis* also failed to find any which appear to be related to *N. edax.* Rather than create a new subgeneric taxon for *N. edax,* we believe it more prudent simply to recognized its uniqueness and label this species *incertae sedis* within the genus *Nabis* pending a more detailed and broader geographic study of the genus.

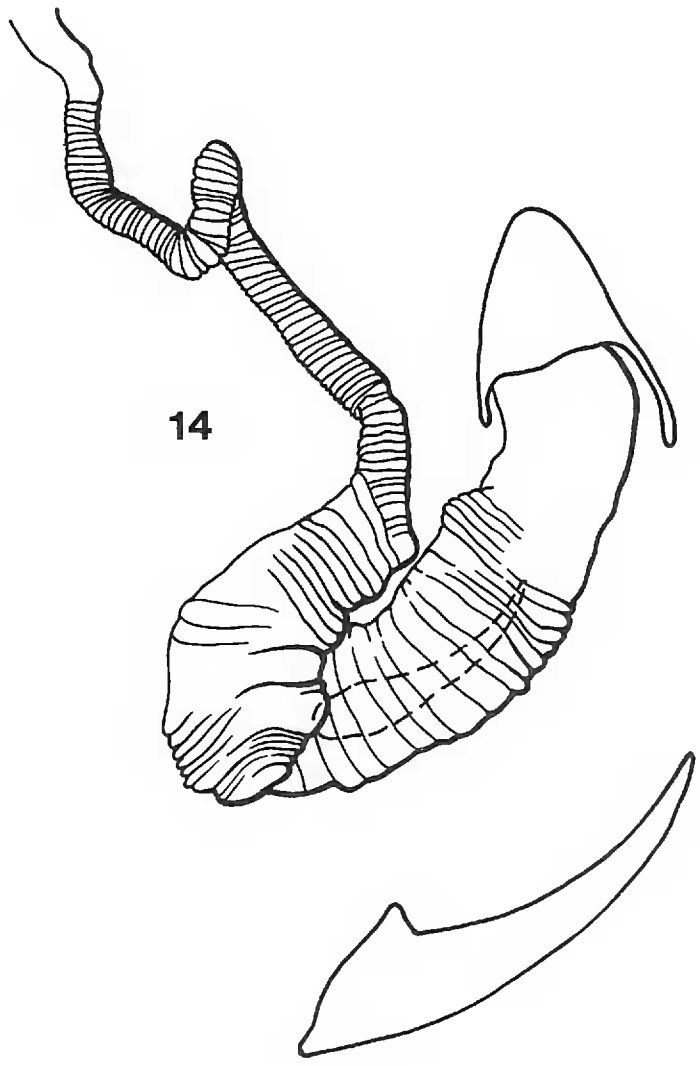
Nabis edax Blatchley
(Figs. 10–14)

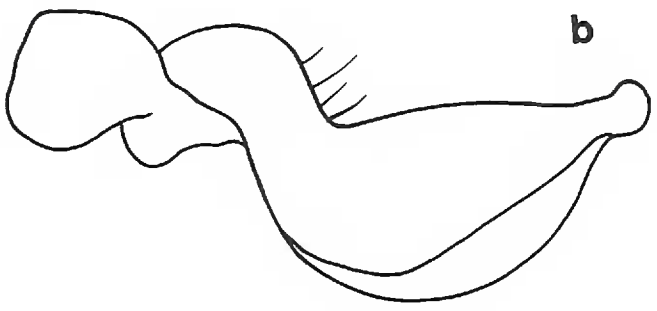
Type.—Holotype male. Data: "Cal[ifornia]: Los Angeles, W.S.R., 12-6-27/ Purdue Blatchley Collection/ TYPE/ LECTOTYPE *Nabis edax* Blatchley, Des. W.S. Blatchley, 1930." In the Purdue University Insect Collection.











Figures 11–14. *Nabis edax* 11. Left metathoracic scent gland. 12. Female seminal depository, dorsal view. 13. Left paramere in lateral (a) and medial (b) views. 14. Aedeagus.

The Lectotype designation by Blatchley was never validated in a publication. Although Blatchley did not designate a holotype in the original description, the specimen should now be considered the holotype by monotypy (ICZN Recommendation 73F, ICZN 1985).

Redescription.—Female.—Medium sized species, total length (7.1–7.8 mm), broadly linear in outline, widest just posterior of clavus. *Head:* Porrect, longer than wide; eyes large, dorsal edges reaching just above vertex, ocelli prominent; pale yellow, area posterior of eye fuscous, ventral surface of head immaculate; antennae linear, I (0.87–1.02 mm), II (1.51–1.69 mm), yellow, segment I with longitudinal fuscous stripe on medial surface, fuscous stripe on dorsal surface of segment II. *Pronotum:* Broad, length (1.43–1.64 mm), posterior width (1.77–2.04 mm), posterior width–collar width ratio >2.5, strongly campanulate, abruptly expanded posteriorly with corners angular (Fig. 10), posterior lobe

elevated, with numerous shallow punctures, posterior margin distinctly carinate, pale yellow. Collar distinct, longer than distance from posterior margin of eyes to posterior margin of head, anterior portion shallowly punctate. Scutellum very broad, wider than long, middle depressed and margins slightly elevated, pale yellow. *Hemelytra:* Shiny, smooth or minutely granulose, anterior one third of clavus and corium with small shallow punctures; clavus short and broad, straw yellow, small fuscous spot at apex of claval suture; veins of membrane indistinct, membrane with indistinct, broad fuscous stripe, more defined apically. Dorsum covered with long, inclined yellow setae. *Venter:* Ventral surface pale yellow. Metathoracic scent gland distinct, elongate oval, apex evenly rounded (Fig. 11). Legs immaculate or with light brown spots at base of setae. Fore and hind femora without black teeth or denticles on ventral surface, middle femora occasionally with a single short row near apex. Hind legs more robust than other *Nabis* spp.; hind tibia pilose, with erect hairs, the longest of which are almost 2× the width of the tibia. Seminal depository short, thick and symmetric (Fig. 12), strongly wrinkled along the sides and base; oviducts wide, arising from a meso-dorsal position on the seminal depository.

Male.—Similar in size and shape to females but much darker, with color patterns more distinct. Length (7.18 mm). *Head:* Grey on dorsum, ventral surface testaceous. *Pronotum:* Less wide or campanulate than female, length (1.54 mm) posterior width (1.86 mm), with a dark fuscous middorsal stripe. Scutellum also with wide dark fuscous median stripe. *Hemielytra:* Midline of membrane with an irregular, broad fuscous or smoky stripe. Propleuron fuscous; abdomen with testaceous to fuscous lateral stripe. Meso- and metafemora and tibiae with fuscous spots. *Genitalia:* Paramere most similar to that of *N. rufusculus* (Fig. 13). Apex produced, with a short, squared tip. Ventrolateral surface with a wide row of erect setae, following curve of ventral margin of paramere. Aedeagus with a single large sclerite without a tooth at its base (Fig. 14), situated in distal half of aedeagus.

Diagnosis.—To serve as a diagnosis, we have revised a portion of Harris' key to North American Nabidae (1928) to include *N. edax*:

19. Head beneath in greater part fuscous to black; posterior tibiae dotted with fuscous; brachypterous form with closed cells in the membrane; male paramere with long sinuate stem ..... *roseipennis* Reuter
Head beneath in greater part yellow to testaceous; posterior spotted or immaculate; male paramere with short rectangular stem 20

20. Maximum width of posterior femora > distance between eye and ocellus; ventral surface of mesofemora lacking black denticles or with only a short row near apex; posterior tibiae of male spotted with fuscous; aedeagus with a single sclerite; posterior tibiae of female pilose, longest setae nearly at right angles with axis of tibia and 2× its width; seminal depository without sclerotized ring; coastal California .... *edax* Blatchley
Maximum width of posterior femora ≤ distance between eye and ocellus; ventral surface of mesofemora with black denticles; posterior tibia of male usually immaculate; aedeagus with two sclerites; posterior tibiae of female not pilose, all setae short; seminal depository with sclerotized ring present, wide spread 20a

20a. First antennal segment thickened distally, somewhat sinuate above; brachypterous form common, usually with no closed cells in membrane; diameter of blade of male paramere greater than that of an eye viewed from above ..... *rufusculus* Reuter
First antennal segment scarcely thickened distally, from above almost straight; brachypterous form unknown; diameter of blade of male equal to that of an eye ..... *kalmii* Reuter

Material Examined.—USA. CALIFORNIA. *CONTRA COSTA Co.:* Pittsburg, 18 Nov 1923, J.D. Martin. *FRESNO Co.:* Tranquillity, Fresno Slough, 8 Jul 1962, P. F. Torchio. *LOS ANGELES Co.:* Los Angeles, Hancock Park, 6 Dec 1927, W. S. Blatchley; Milpitas, 23 Jun 1955, (Acc. No. 121), P. F. Torchio. *SANTA CLARA Co.:* San Jose, 30 Sep 1954, D. R. Bale. *COUNTY UNCERTAIN:* South Eastern California, 8 Jun 1962, light trap, USDA.

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